FAQ Communication over PROFIBUS

service & SUPPORT

FDL connection over PROFIBUS between PC station and SIMATIC S5

SIEMENS

FAQ

Entry-ID: 16733087

Inhaltsverzeichnis

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Entry-ID: 16733087

Question

How do I create a FDL connection to a SIMATIC S5 over PROFIBUS for the SIMATIC NET OPC Server with the SIMATIC NET PC Software?

Answer

The instructions and notes listed in this document provide a detailed answer to this question.

1 Assignment of tasks

In this example a CP5611 is used, that implements FDL communication over the OPC Server with a S5 station on PROFIBUS.

NOTE The method described in these instructions also applies to the communications processors CP5613/14 (A2), CP5621, CP5511 and CP5512.

1.1 Condition

It is assumed that one of the two following configuration tools is installed:

- NCM PC
  NCM PC is supplied with the SIMATIC NET CD and allows you to create PC projects and open STEP 7 projects. It is, however, not possible to edit S7 blocks in the STEP 7 project with this software.
- STEP 7
  STEP 7 is a separate software package with which you can create S7-400, S7-300 and PC projects. S7 blocks can be edited with this software.

Only one of these tools can be installed.

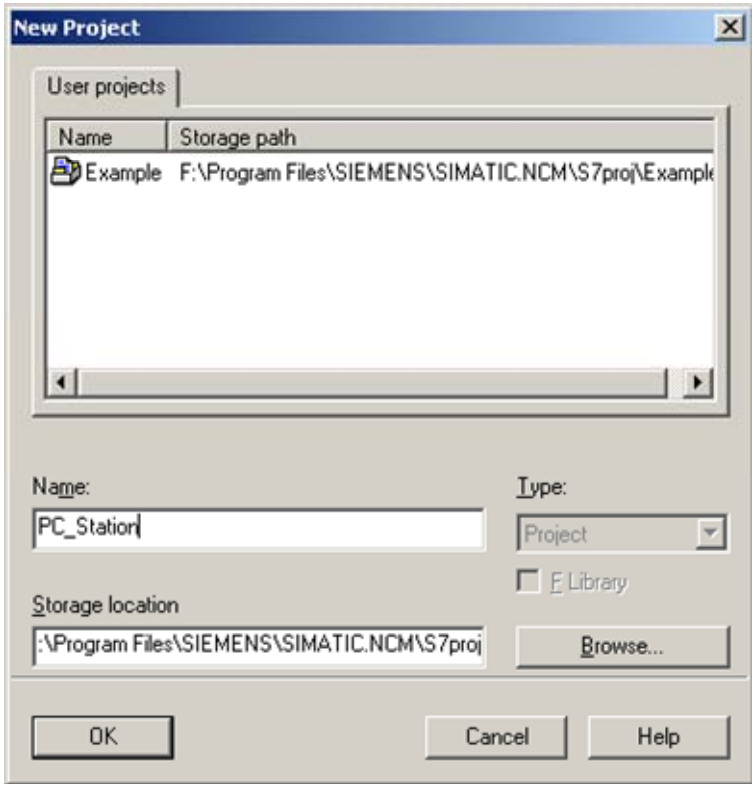
In chapter 2 “Configuration of the PC station” is described the configuration of PC station so that you can use the FDL communication over PROFIBUS to exchange data between PC station and S5 station.

2 Configuration of the PC station

After successful completion of the hardware and software installation of the SIMATIC NET CD and the configuration tool and after restarting your computer, you start NCM PC or STEP 7 with "Start → (in Windows XP: All Programs→) SIMATIC → SIMATIC Manager or SIMATIC NCM PC Manager or using the desktop icon of the same name.

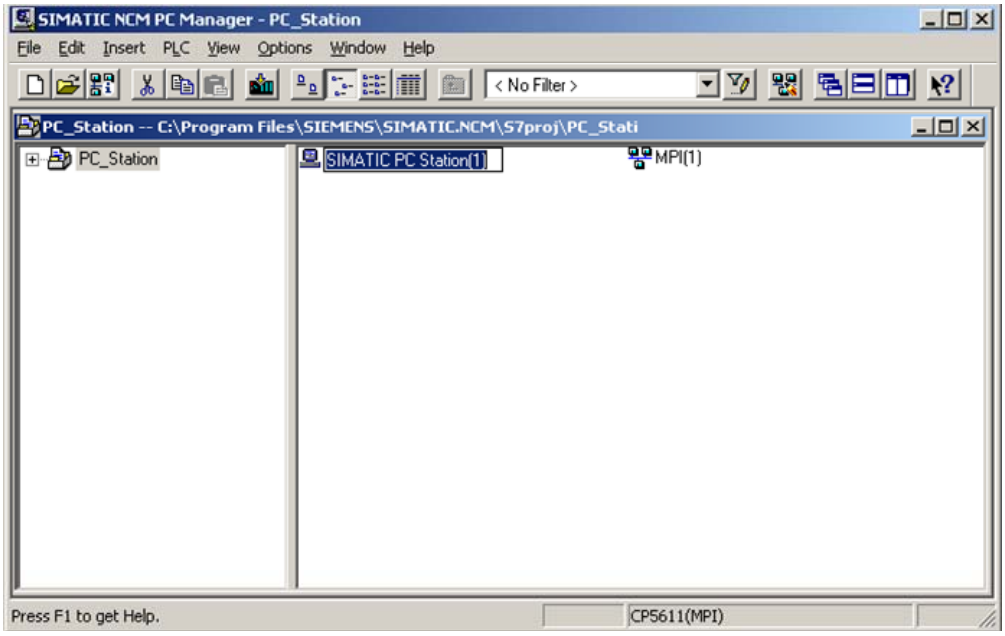
Create a new project with "File → New".

Figure 2-1 giving the project a name



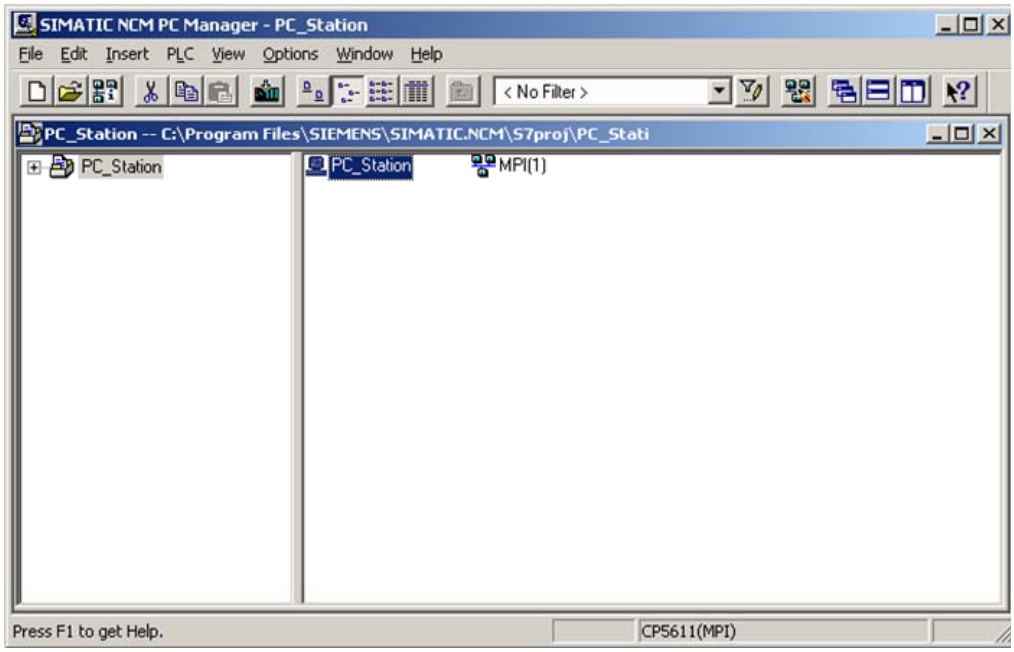
Confirm the project name you have entered (in the example: "PC_Station") with OK. An empty STEP 7 or NCM PC project is then created.

FIgure 2-2 inserting the PC station



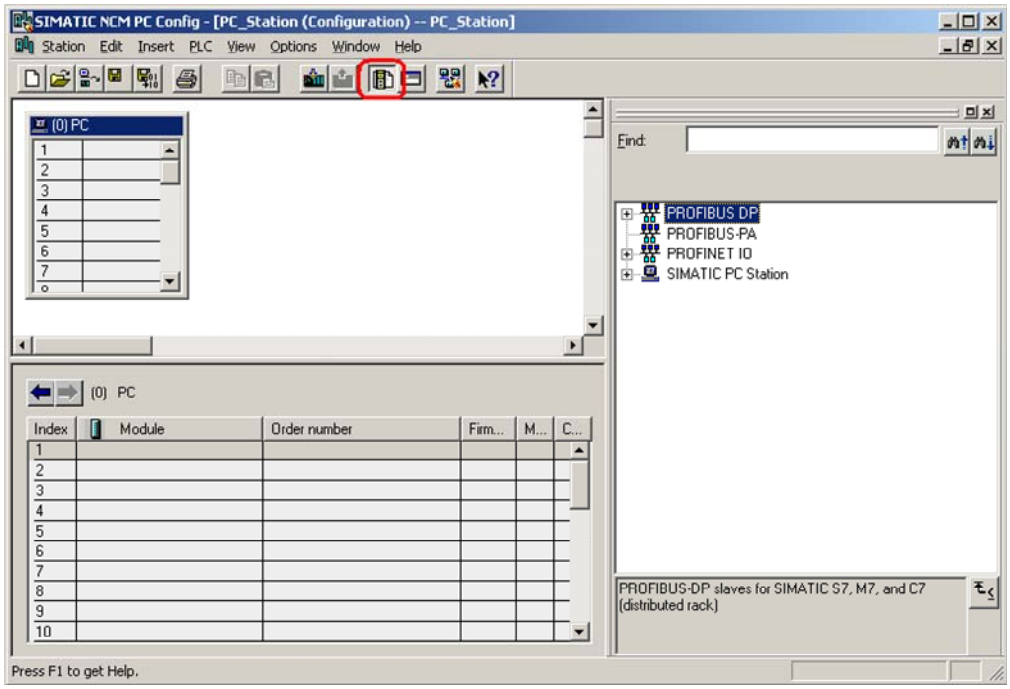
With the menu command "Insert → Station → SIMATIC PC Station", you insert the PC station.

Figure 2-3 changing the name of the PC station



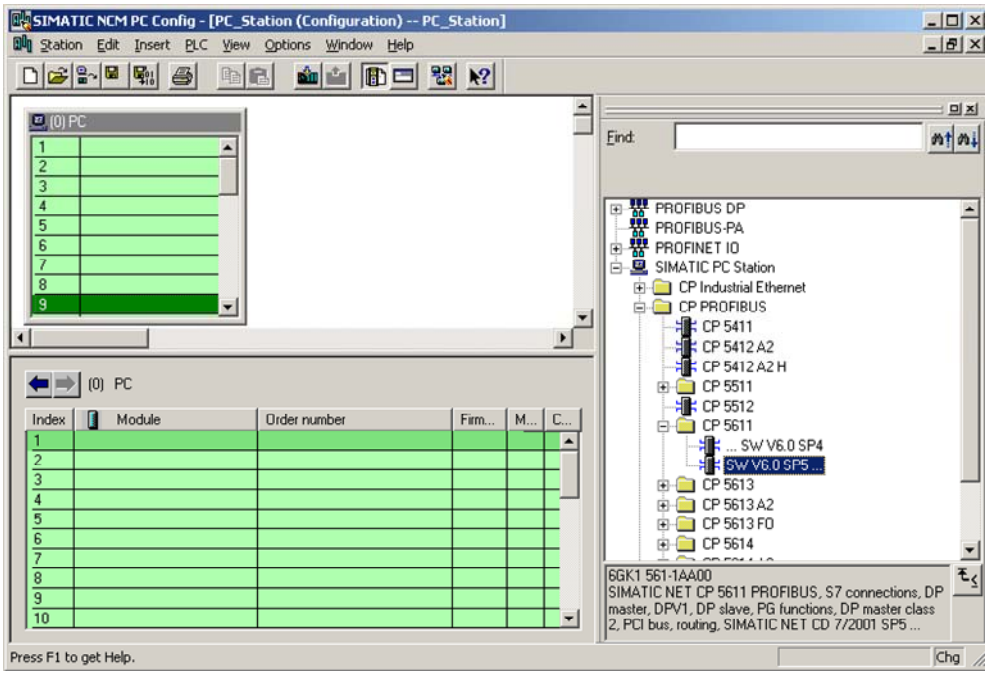
Give the PC station you have just inserted the same name as your computer (in the example: "PC_Station").
Now open the hardware configuration of the PC station by selecting the PC station, then pressing the right mouse button and selecting "Open Project" (STEP 7: "Open Object").

Figure 2-4 hardware configuration of the PC station



You will see an empty rack. If you cannot see the hardware catalog, click on the button marked in red.

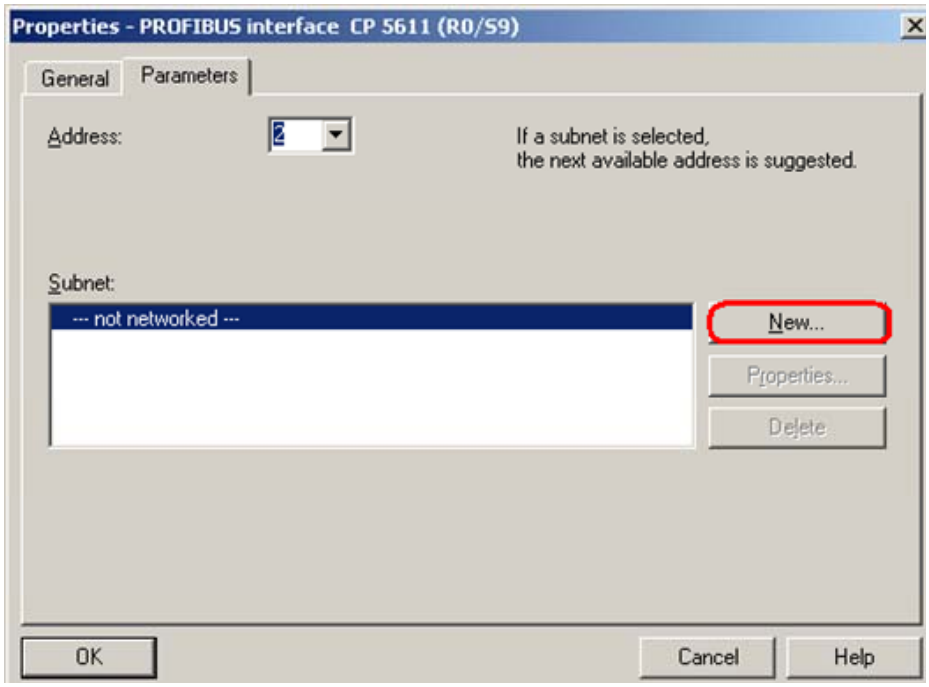
Figure 2-5 selecting the modules from the hardware catalog



Now place your PC modules in this rack (for example by dragging them from the hardware catalog).
If you use a CP5613/14 (A2) (or CP5511 or CP5512) you will select the CP5613/14 (A2) (or CP5511 or CP5512) from the STEP7 hardware catalog.
If you use a CP5611 A2 or CP5621 you will configure these modules asCP5611.

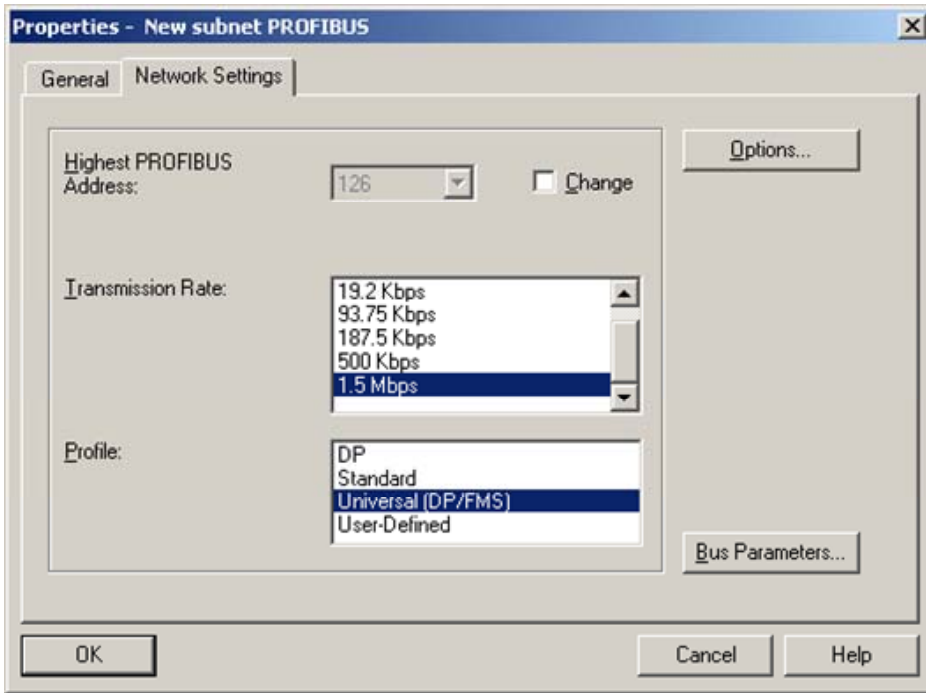
The following dialog appears automatically after you insert the module in the PC station.

Figure 2-6 address assignment dialog



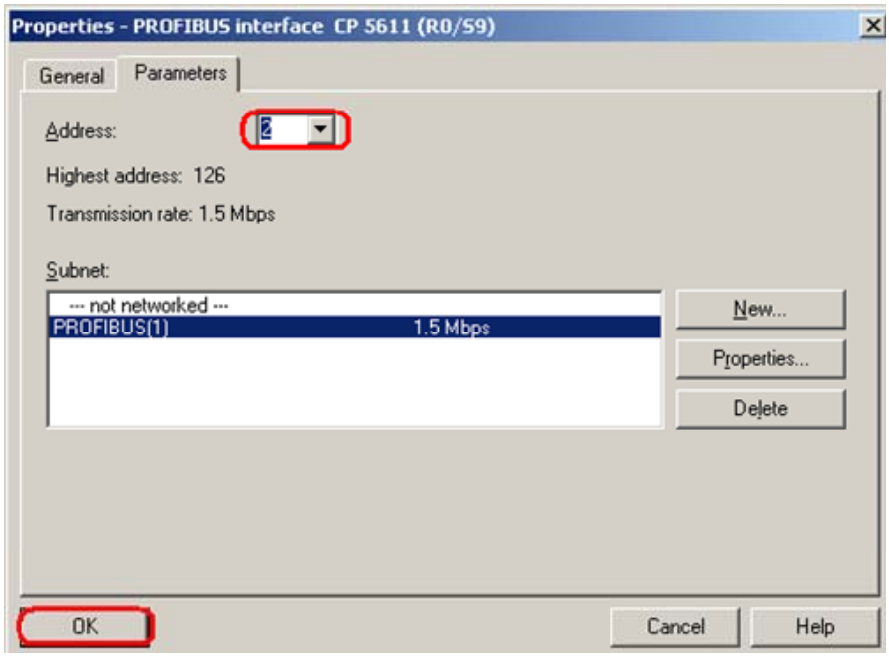
Click on the button "New" to create a new PROFIBUS subnet. The property view of the PROFIBUS subnet will open. Change to the register „Network Settings“and set the relevant bus parameters.

Figure 2-7 configuring bus parameters for PROFIBUS subnet



Confirm the dialog with „OK“.

Figure 2-8 property view of the CP5611

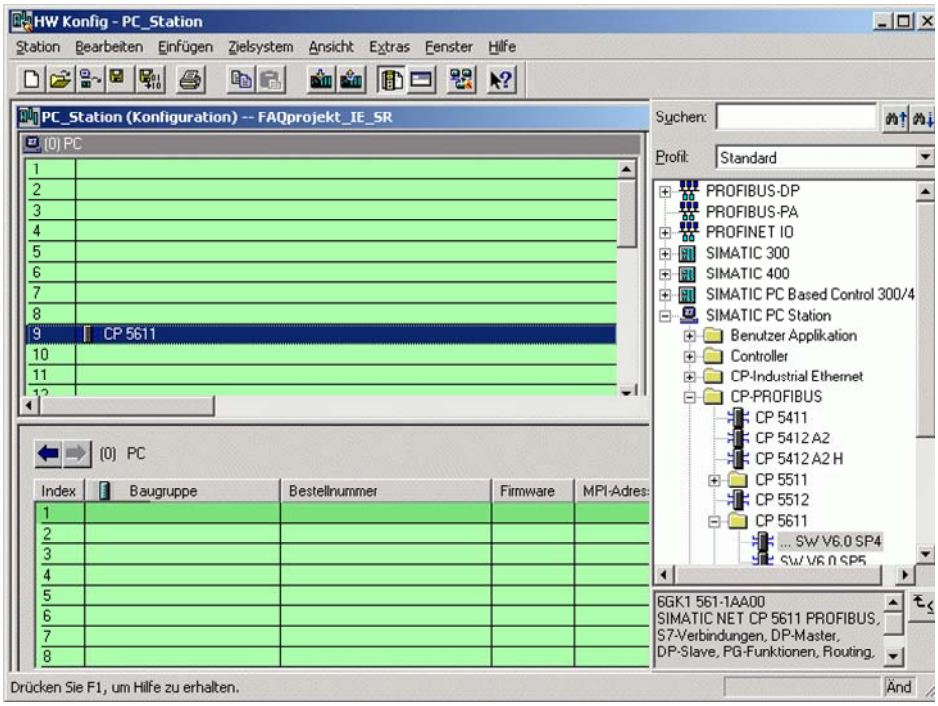


Connect the CP5611 to the PROFIBUS subnet which you have just configured or to a PROFIBUS subnet which already exist.

Close the property view of the CP5611 with „OK“.

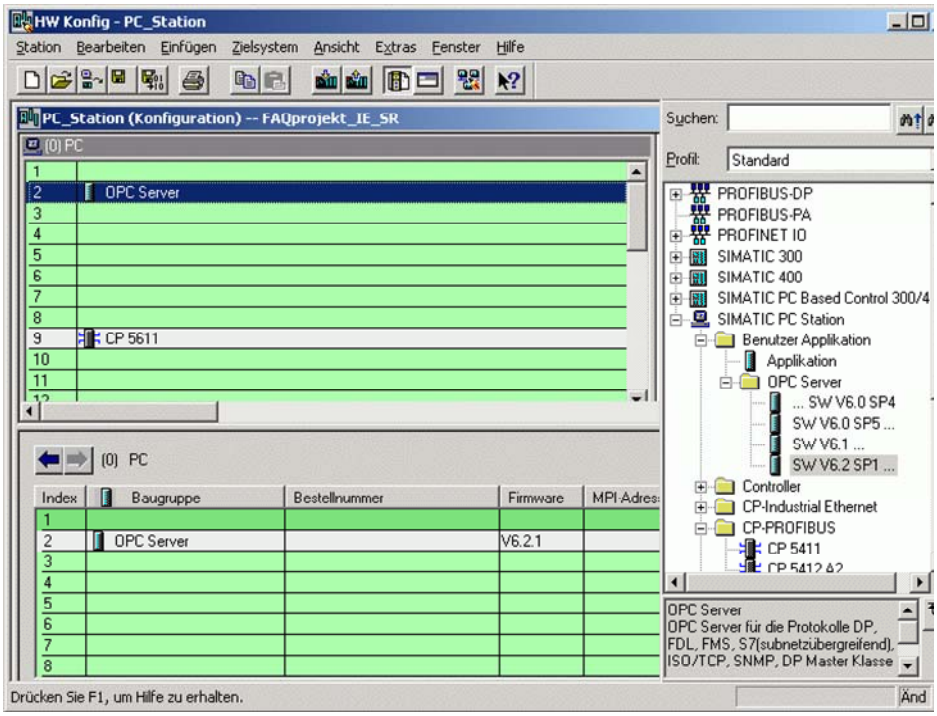
The configuration and networking of the CP5611 is finished now.

Figure 2-9 hardware configuration – projecting the CP5611



The module has now been placed in a slot in the rack. You can select any slot. There are no restrictions.

Figure 2-10 configuring the OPC server



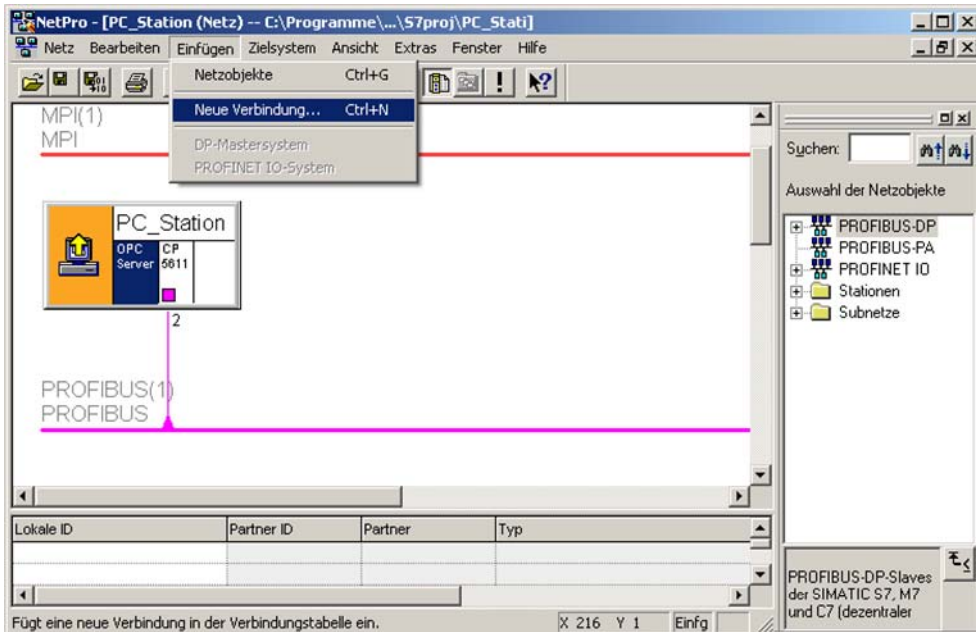
Select the OPC server in the hardware catalog and then drag it to any slot.

Figure 2-11 button „NetPro“

Now open the NetPro program. Use the button marked red in the toolbar in Figure 2-11 button „NetPro“.

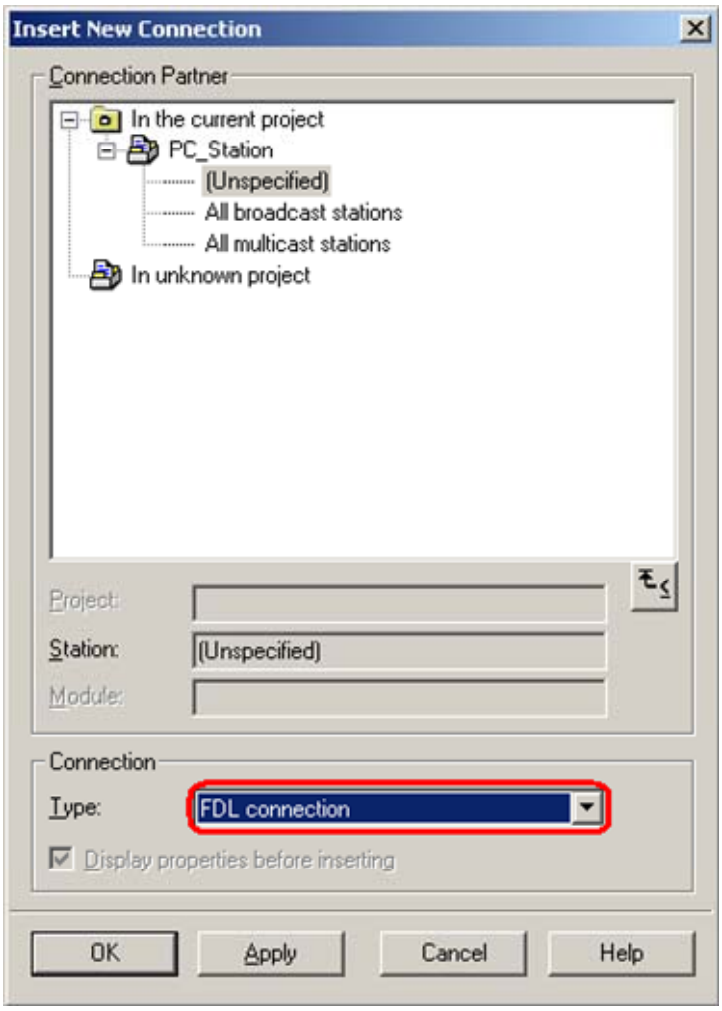
In NetPro you configure a FDL connection to exchange data between the OPC server and the S5 station.

Figure 2-12 configuring the FDL connection in NetPro



Select the OPC server and choose the menu command "Insert → New Connection" to create a new connection for the OPC server or right-click the OPC server → „Insert → New connection“.

Figure 2-13 Insert a new connection in NetPro

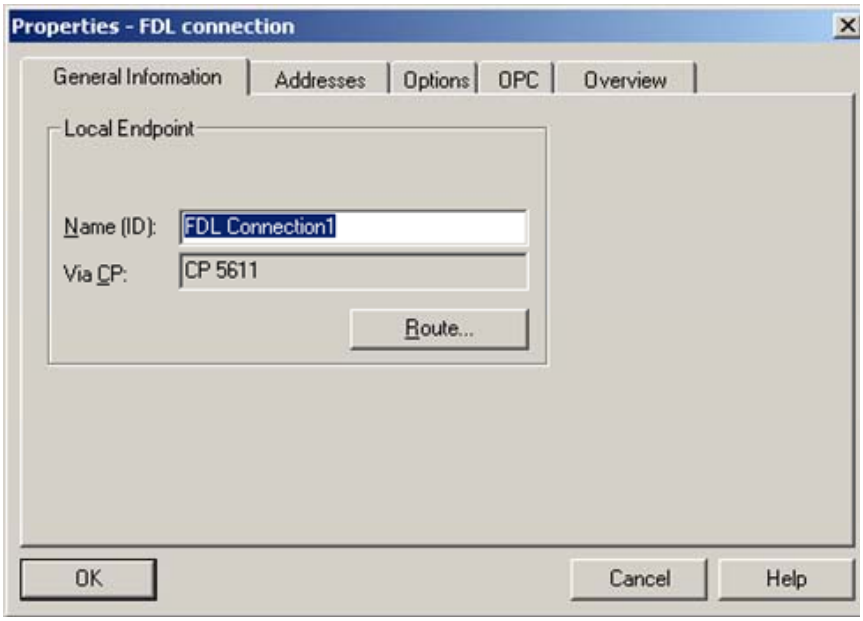


Because the communication partner isn't configured in the same S7 project like the PC station, you have to configure unspecified connection. In the dialog box "Connection Partner"you have to select „Unspecified"for the connection partner.

Furthermore you have to select the connection type „FDL connection".

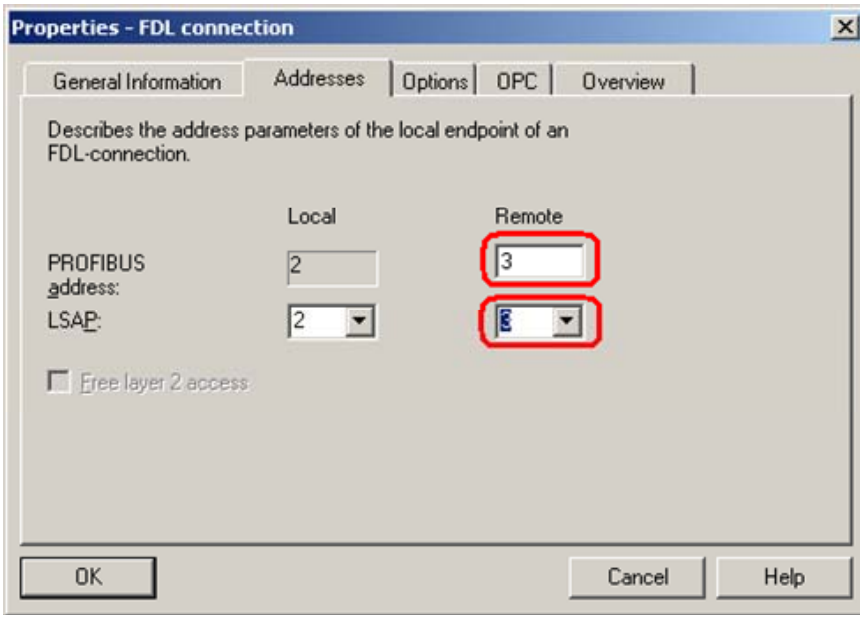
Click on the button „Apply" so that the property view of the FDL connection will open.

Figure 2-14 property view of the FDL connection → register „General Information“



Insert a name for the FDL connection. Following change to the register "Addresses".

Figure 2-15 property view of the FDL connection → register „Addresses“



By indicating the PROFIBUS addresses and LSAPs you uniquely identify the FDL connection between the PC station and the S5 station.

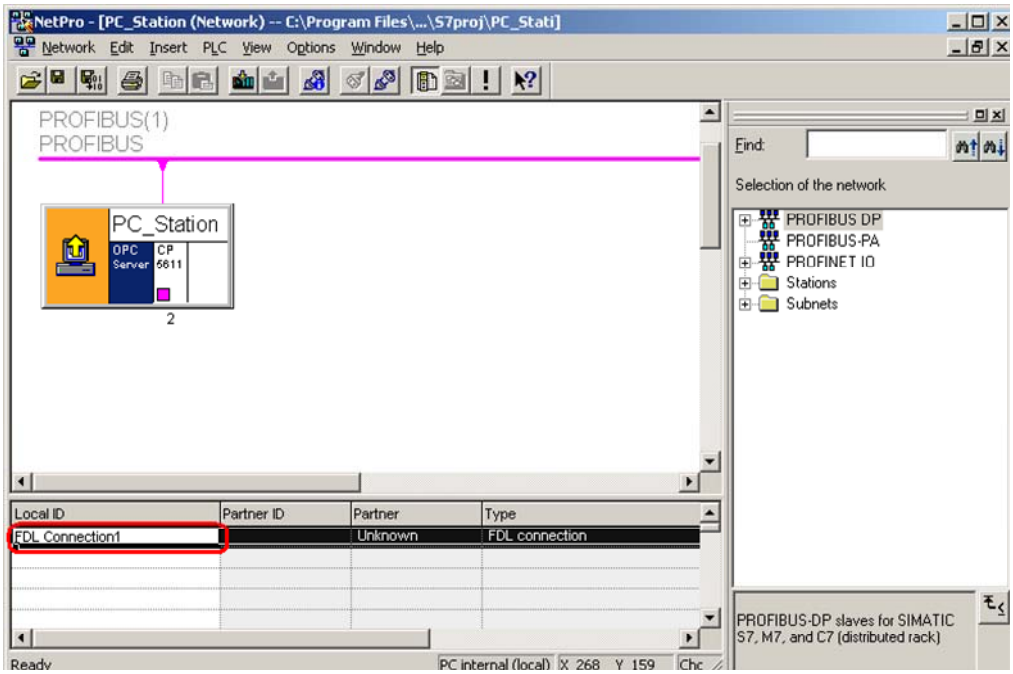
For remote set the PROFIBUS address of the S5 station. Set the LSAPs to uniquely identify FDL connection. For local you have to set the LSAP of the PC station and for remote you set the LSAP of the S5 station.

NOTE You will have to consider the indication of the PROFIBUS addresses and LSAPs if you configure the FDL connection in the S5 station.

Confirm the property view of the FDL connection with „OK“. So you come back to the dialog „Insert New Connection“. Confirm this dialog with „OK“.

The FDL connection which you have just configured is shown in the connection table of the PC station.

Figure 2-16 connection table



Now the configuration of the of the FDL connection is finished.

You have to save the configuration in NetPro.

You have to leave open the program NetPro while initialization of the CP5431 and configuration of the FDL connection in the S5 station.

3 Configuration of the SIMATIC S5

3.1 Initialization of the CP5431 and configuration of the FDL connection

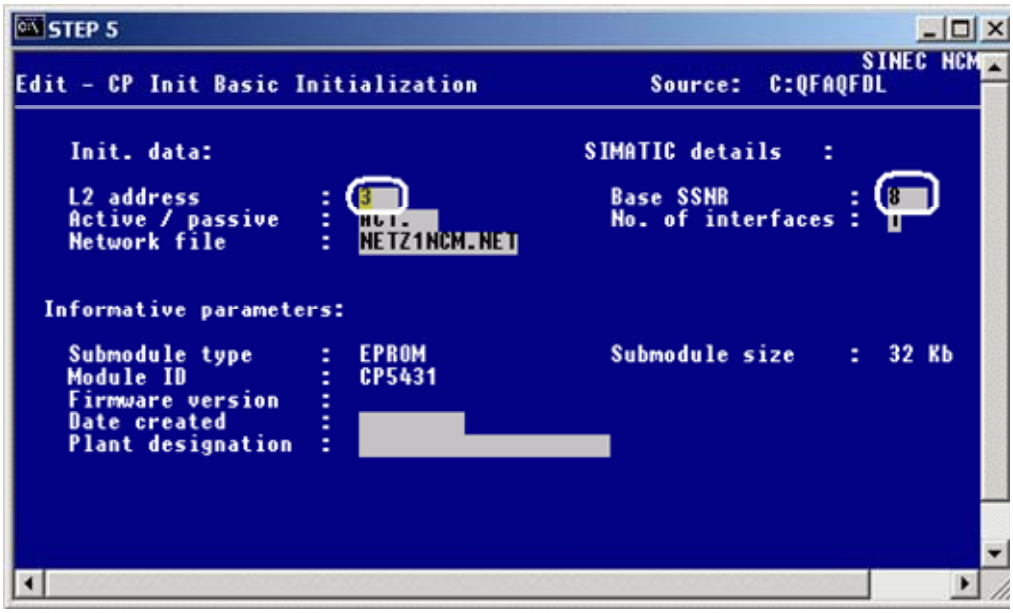
Starten Sie STEP 5 über Start → SIMATIC → STEP 5

Wechseln Sie über die Taste "F9" in das Konfigurationstool des CP5431 "SINEC NCM COM 5431".

NOTE The configuration tool „SINEC NCM COM 5431“ is an additional software, which is integrated STEP5, to configure the CP5431. This software isn’t included in the standard STEP 5 package. You have to order it separately.

Initialize the CP5431 using the „Edit → CP_Init“menu.

Figure 3-1 Initialization of the CP5431



Enter the PROFIBUS address of the CP5431 (L2 address). This address has to correspond to the PROFIBUS address which you have configured for remote in NetPro (see Figure 2-15 property view of the FDL connection → register „Addresses“).

The Base SSNR specifies the CP5431 in the rack. This interface number must be used later in the block calls in the S5 program.

Apply the settings with „F7“.

Open the „Edit → Links → S5-S5 Links“ dialog.

Figure 3-2 creating the S5-S5 Link

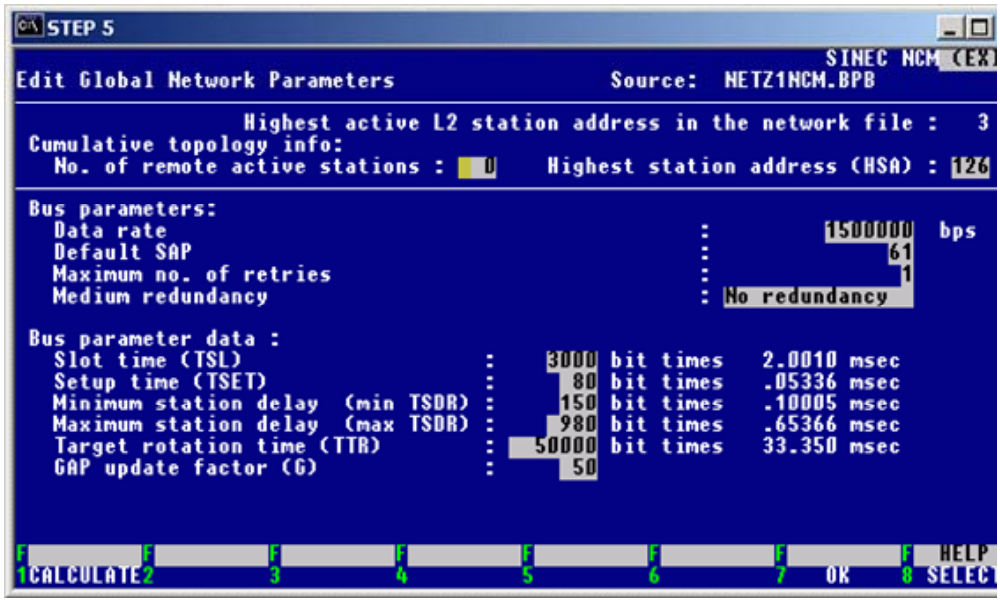
The following declarations have to correspond to the configuration in NetPro:

- Enter the PROFIBUS address of the CP5611 under “Remote L2 station address”.
- Because the OPC server has a high priority by default, you have to select "High" for PRIO.
- To identify the link enter SSAP = 3 (in NetPro: remote LSAP of the communication partner) and DSAP =2 (in NetPro: local LSAP of the PC station).
- You have to set the „Parameters sending“and „Parameters receiving“to exchange data between PC station and S5 station. You have to enter the offset interface number of the PLC for SSNR (with a PLC offset always is 0). The job numbers which are entered under ANR you have to account when you call the SEND und RECEIVE in the S5 program.

Apply the settings with „F7“.

With „Edit → Global Network Parameters“you open the global bus parameters and bus times of the CP5431.

Figure 3-3 global network parameters

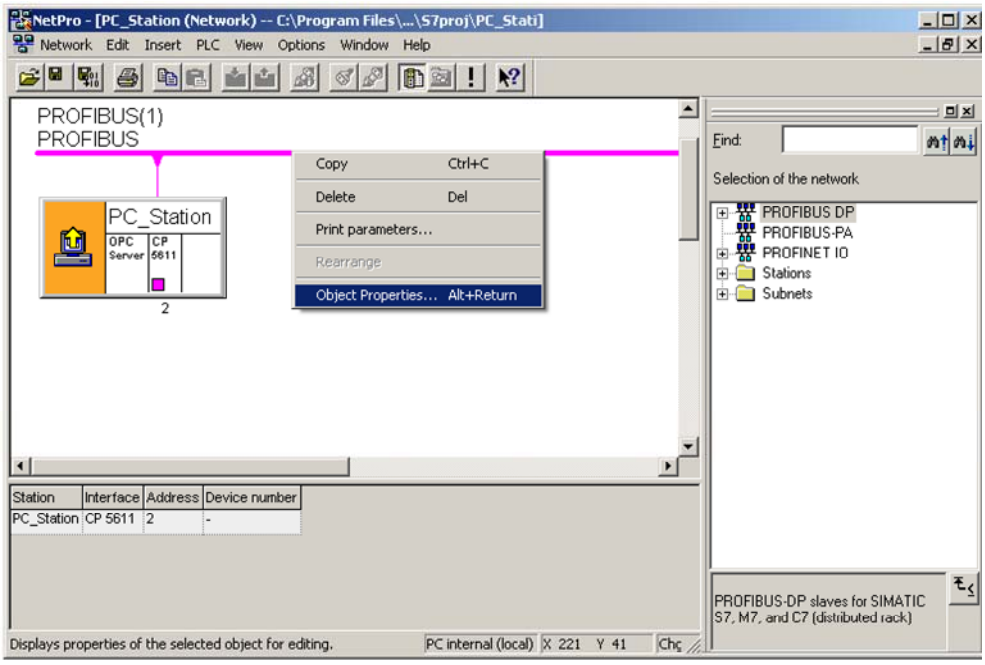


Select the required transmission rate for data rate and recalculate the bus times again by using F1 “CALCULATE”. In this example the data rate is 1500000 bit/s, which mean 1, 5 Mbit/s.

Now change again to the S7 project in NetPro to synchronize the bus times of the CP5431.

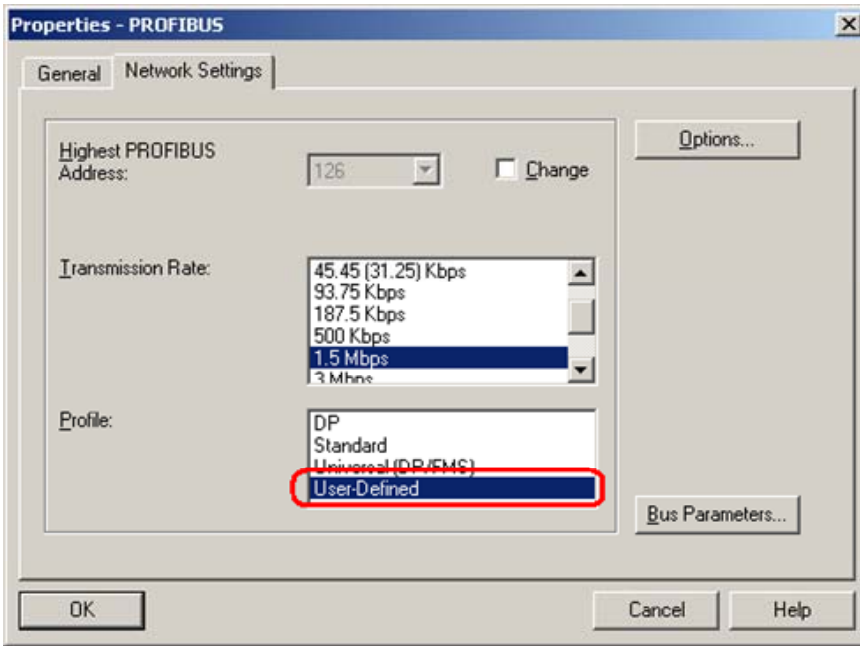
3.2 Synchronization of the bus times

Figure 3-4 opening the object properties of the PROFIBUS subnet



In NetPro right-click on the PROFIBUS subnet, which is assigned to the CP5611, and open the object properties of the PROFIBUS subnet?

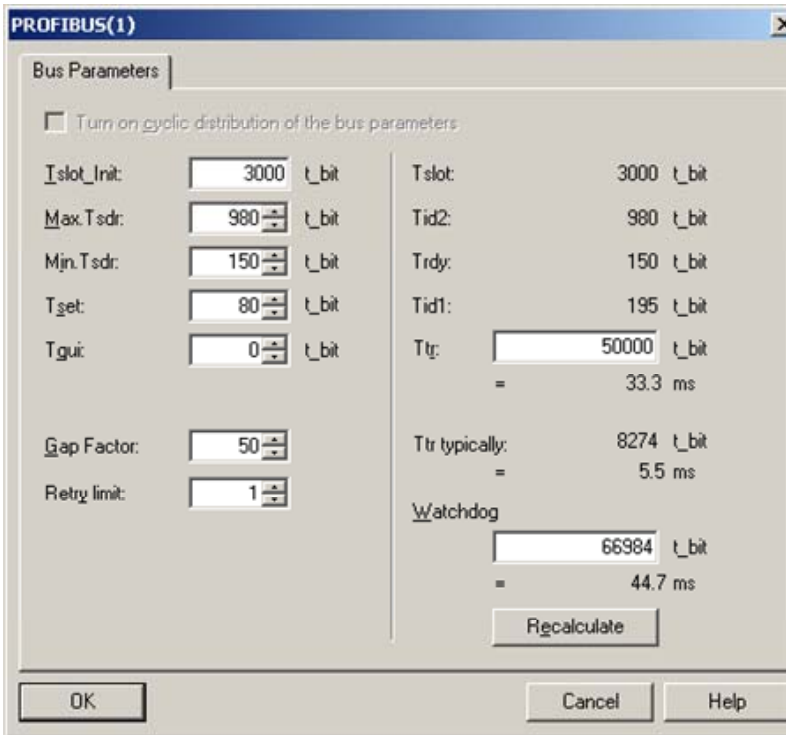
Figure 3-5 property view of the PROFIBUS subnet



In the property view of the PROFIBUS subnet → register „Network Settings“ you select the transmission rate 1,5 MBit/s and the bus profile „User Defined“.

You have to click on the button „Bus Parameters…“. The following dialog will open.

Figure 3-6 bus parameters

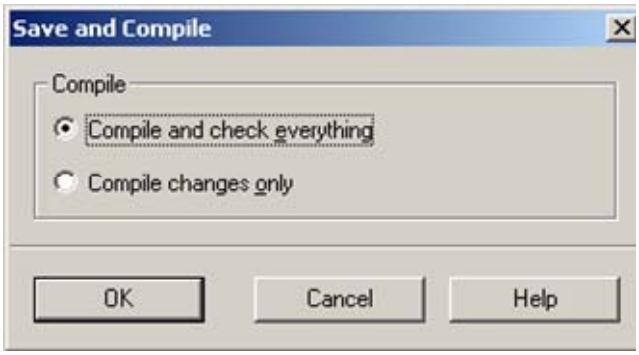


You have to adapt the bus times which are displayed according the settings in the CP5431 of the S5-station (see Figure 3-3 global network parameters).

Following confirm the dialog with „OK“.

You have to save and compile S7 project. Therefore select the PC station in NetPro and click the button „Save and Compile” in the toolbar. This updates the information in the S7 project.

Figure 3-7 Save and Compile



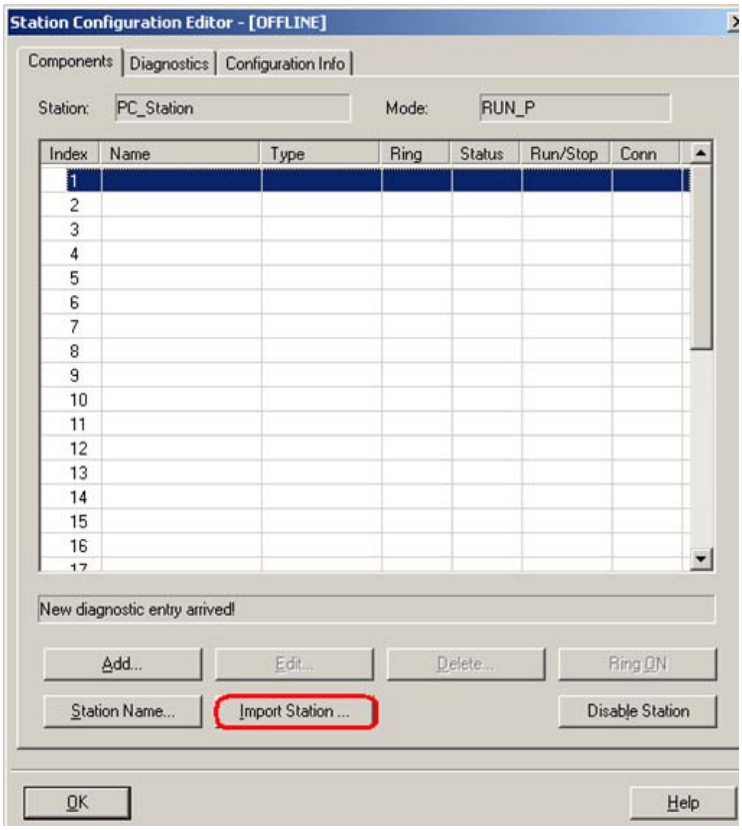
NOTE Warning indications can be displayed while proceeding with the “Save and Compile” of a S7 project. Warnings serve as piece of information and have no functional effect. In case error warnings occur, search for possible divergences in the previous steps of the instructions.

4 Download the configuration into PC station

Open the „Station Configuration Editor“ in the Windows START Menu → „Station Configuration Editor“ or with the following button in the Windows task bar

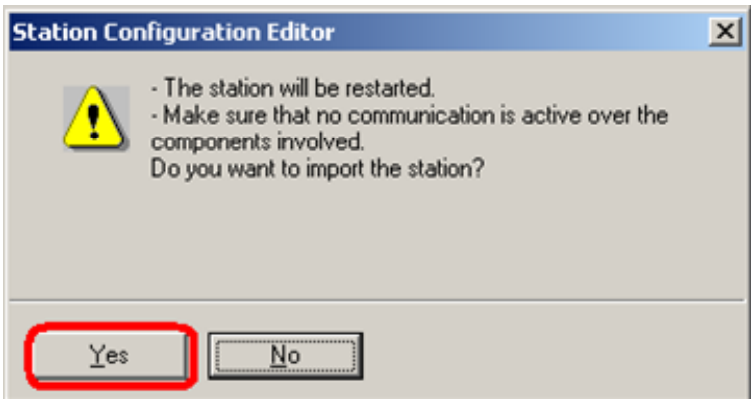
Figure 4-1 button “Station Configuration Editor”

Figure 4-2 Station Configuration Editor



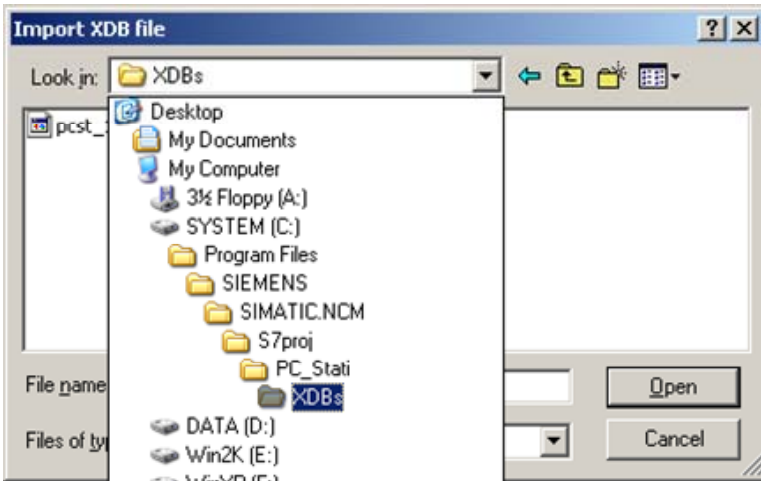
Click the button "Import Station…“. A message about restarting the PC station will open.

Figure 4-3 message about restarting the PC station



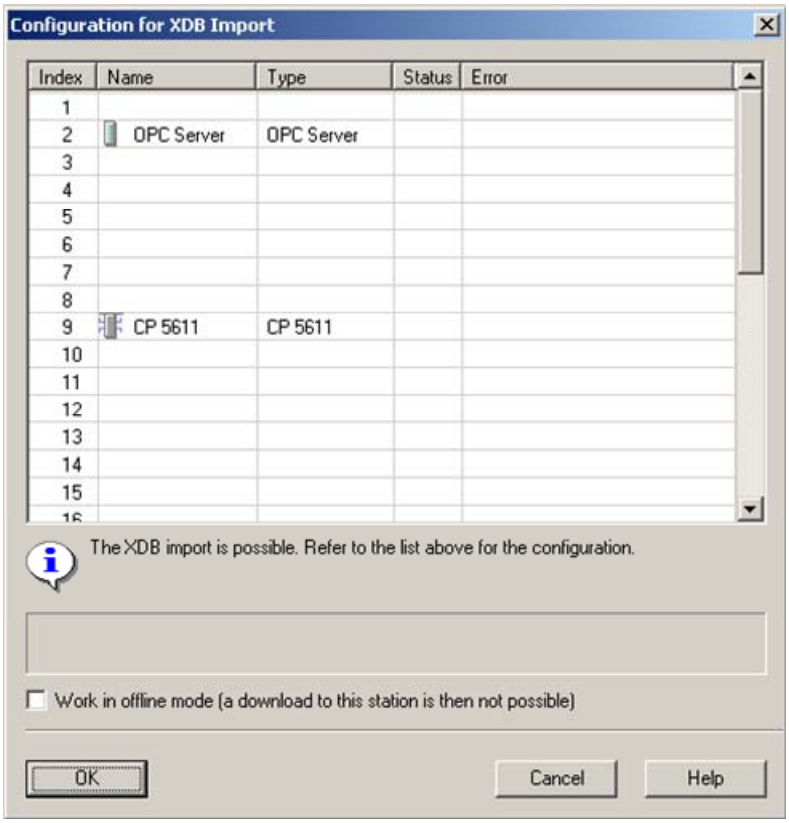
Confirm the message about restarting the PC station with „Yes“. The following dialog to select the XDB file, which should be import, opens.

Figure 4-4 selecting the XDB file



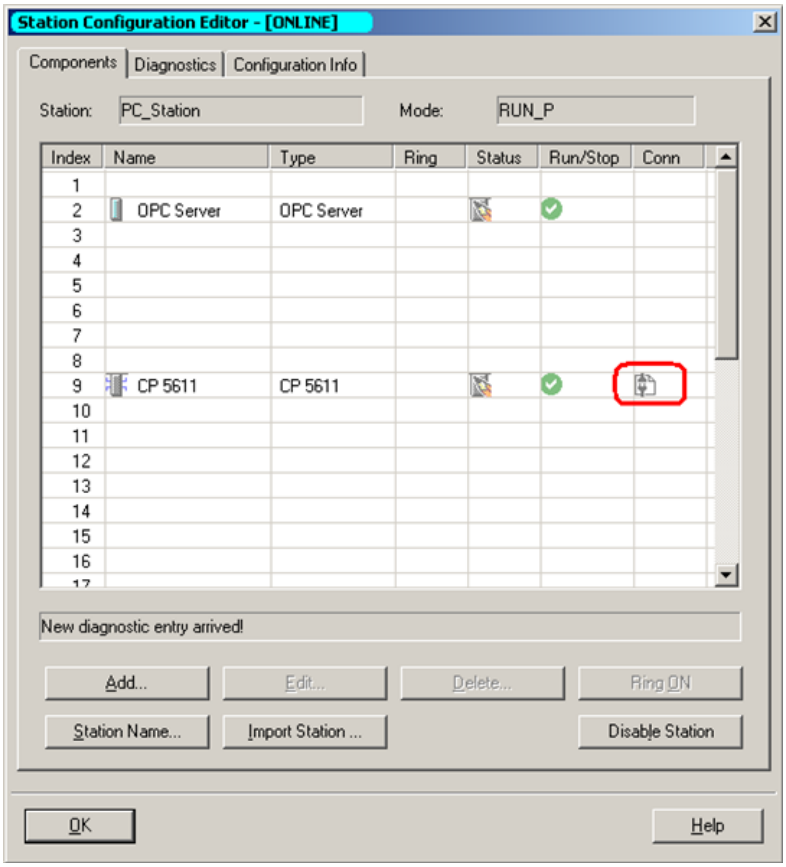
In this dialog you enter the path of the XDB file. The XDB file is always created in the project by NCM PC / STEP 7 (see Figure 2-1 giving the project a name). With the combo box „Search in: “you navigate in the path of the XDB file.

Figure 4-5 Information from the XDB file



As information, you can see once again which modules and applications are configured in the XDB file.

Figure 4-6 PC station is configured



Now the import of the XDB file is finished and the configuration is downloaded.

In the column connection, which is marked red, you see that the connection is also been downloaded.

So the configuration of the PC station is finished.

5 Download the configuration into CP5431

Change to the configuration tool of the CP5431.

Apply the configuration of the bus time with „F7“.

Synchronize the network with „Network → Synchronize Network“. The globally set bus parameters are adopted in the local bus parameters.

Then download the configuration to the CP5431 with „Transfer → FD → CP“.

Return to the STEP 5 configuration dialog with „File → Exit“ and „ESC“.

6 Description of the S5 program

Synchronization of the CP5431 with the PLC using the SYNCHRON call in the start-up OBs

Insert the following start-up OBs in your S5 program:

- OB20
- OB21
- OB22

In these OBs you have to program the FB125 "SYNCHRON" call, which synchronizes the PLC and the CP5431.

Figure 6-1 FB125 „SYNCHRON“ call

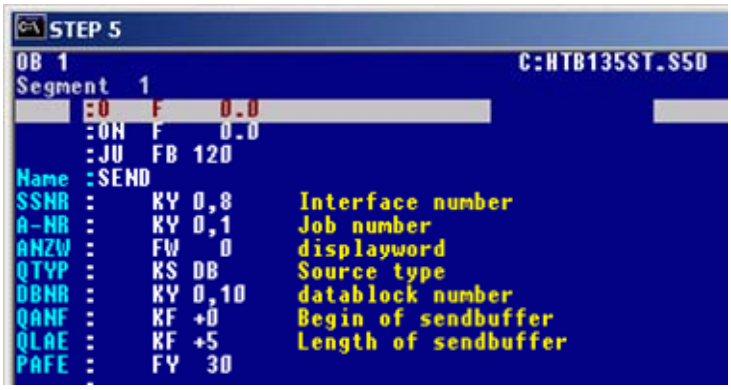
Calling the SEND/RECEIVE block in OB1

Create the OB1. Form the RLO = 1 with the two statements:

- O M0.0
- ON M0.0

Insert the SEND block call (FB120).

Figure 6-2 FB120 „SEND“ call



NOTICE **Specify the length of the send area in words.**

Form an RLO = 1 with the two statements:

- O M0.0
- ON M0.0

Then add the RECEIVE block call (FB121) after this.

Figure 6-3 FB121 „RECEIVE” call

NOTE

The „SEND“and „RECEIVE“blocks are executed only when RLO=1 prior to the call.

If the length of the receive area is preset with „-1“the length of the data will detect automatically (parameter: ZLAE = -1).

Save OB1 with „F7”.

Creating the send and receive buffer

Because the send and receive buffer must be located in DB10, this must be created in the project and declared with an adequate length.

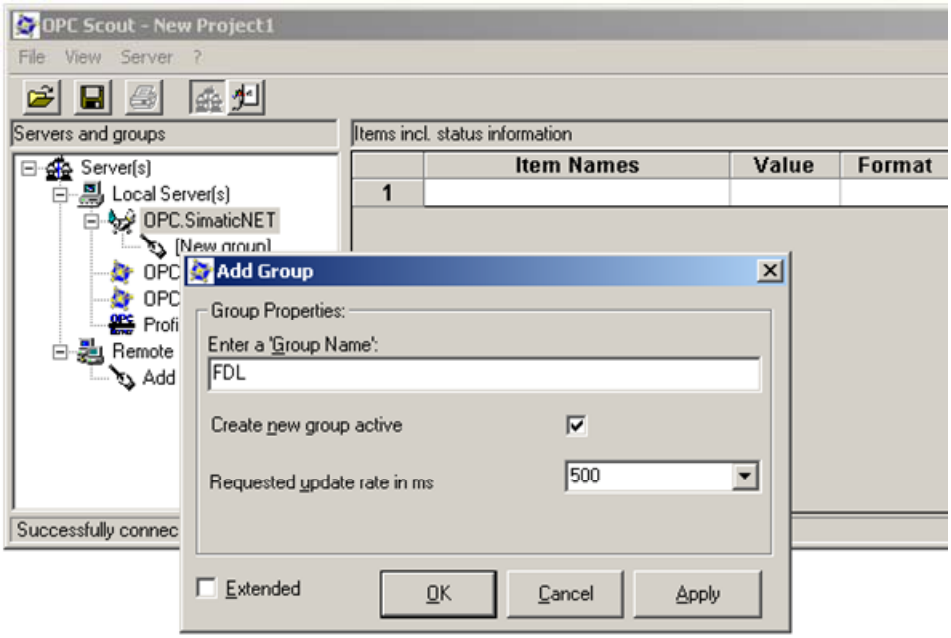
Then download the entire program to the S5 station.

7 Start of the OPC Scout

Start the OPC Scout with "Start → SIMATIC → SIMATIC NET → OPC Scout".

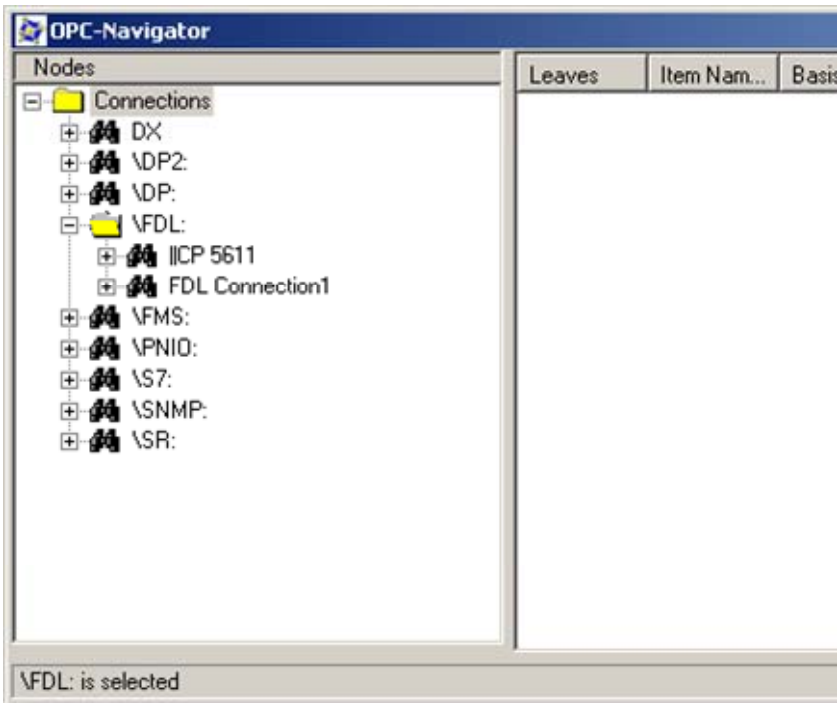
Double-click the „OPC.SimaticNet“for connection with the SIMATIC NET OPC server. In the dialog that appears, enter a suitable group name and confirm this with OK.

Figure 7-1 connecting with the OPC server and enter a group name



Double-click the OPC group which you have created. The "OPC-Navigator" opens. You will now see your protocols in the OPC-Navigator. Double-click on "FDL". The connection name you configured in NetPro appears.

Figure 7-2 OPC-Navigator

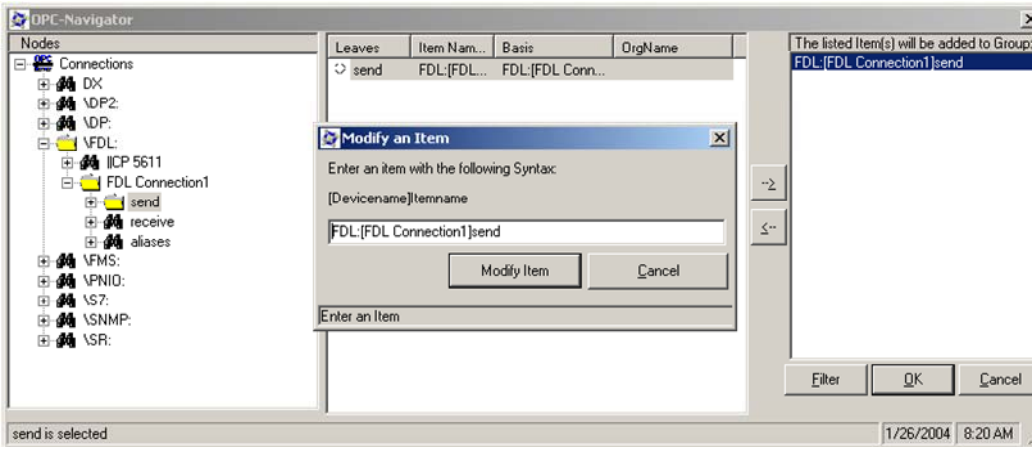


Double-click the FDL connection to define new items and add existing items respectively for the communication.

In the OPC-Navigator select "send". In the middle section appears an item. Move this "send" item to the right section with the button "→".

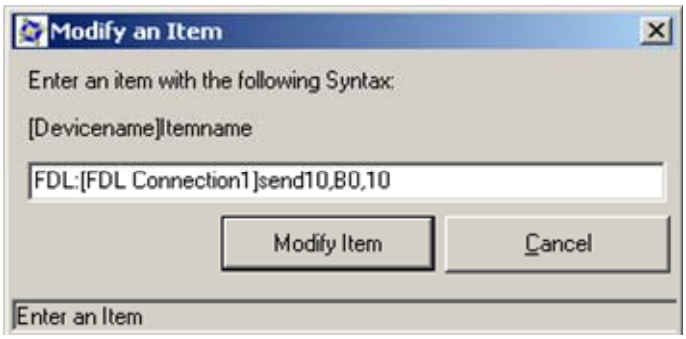
Double-click the „send“item in the right section.

Figure 7-3 adding the „send“item



Change the name of the „send“item (see Figure 7-4 changing the name of „send“ item) and click the button "Modify Item".

Figure 7-4 changing the name of „send“ item

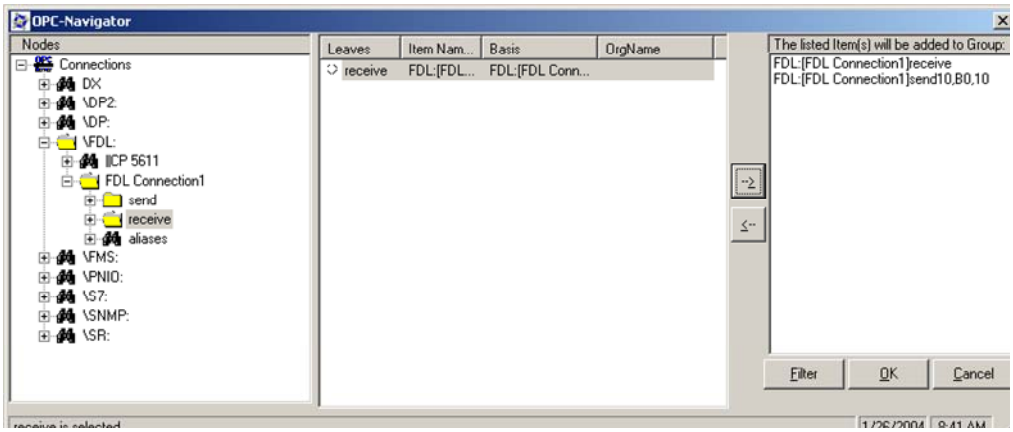


NOTICE **The item "... send 10, B0 ..." means, that a send buffer of 10 Bytes is reserved on the PC station. Starting at Byte 0 of this buffer, 10 Bytes are sent to the S5 station.**

In the OPC-Navigator select "receive". Move the existing “receive” item which appears the middle section to the list in the right section with the button "→".

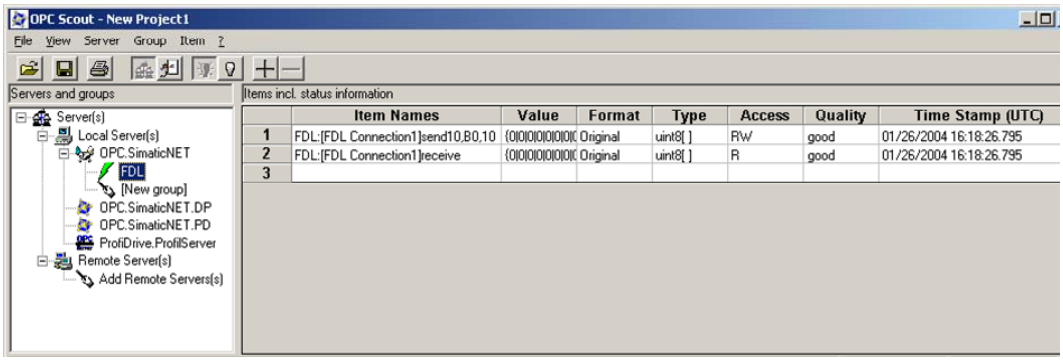
Click the button “OK”.

Figure 7-5 adding the „receive“ item



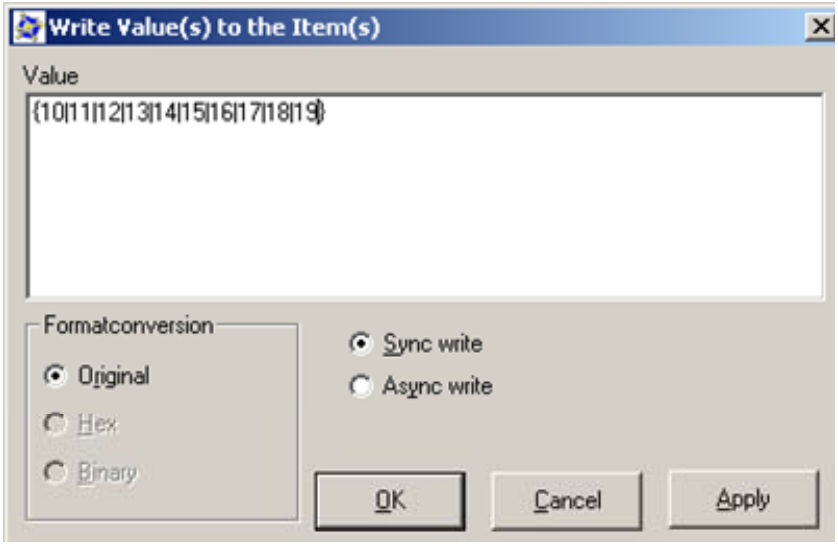
The items are added in the OPC Scout. If the quality is good the connection is established and it’s possible to read and write the items respectively.

Figure 7-6 OPC-Scout



Double-click the column value of the "send" item to write values to the send buffer.

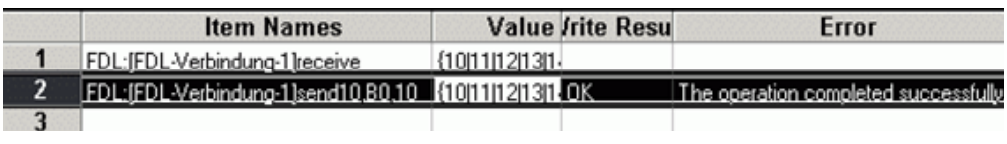
Figure 7-7 writing values



The default structure of the value input {0|0} must not be modified. Only the values themselves may be modifying {1|1}.

Even if only one byte has changed, all bytes of an array (as used here) will always write in a write job.

Figure 7-8 successful write job



Entry-ID: 16733087

With the services send and receive successful writing of data must be checked in the columns „Write Result“and „Error“. The columns „Write Result“and „Error“can be made visible in the „View → Options“menu.

8 Basic configuration instruction

8.1 Interface number (SSNR)

- The interface number of the CP is assigned in the configuration tool of the CP 5431 "SINEC NCM COM 5431" in the (Edit → CP Init) dialog.
- The SSNR must be specified as a parameter in all communication blocks of the PLC (FB120, FB121, FB125, FB126 and FB127).
- The interface number must be divisible by 4 (0, 4, 8, 16…).

8.2 SEND (FB120) and RECEIVE (FB121), SEND_A (FB126) and RECV_A (FB127), SYNCHRON (FB125)

- The values specified for QLAE and ZLAE are word values (QLAE = 0, 10 → send 10 words; ZLAE = 0, 10 → receive 10 words).
- The PAFE and ANZW parameters are output parameters. These are used for diagnostics and job monitoring. For more detailed information, refer to the manuals on the CPs.
- The job number (A-NR) specifies the connection configured on the CP (see Figure 6-2 FB120 „SEND“ call and Figure 6-3 FB121 „RECEIVE” call).
- The blocks must be called using unconditional calls (for example JU FB120).

9 History

Version	Date	Changes
V 1.0	28.03.2008	First Issue